

Algorithms for Glycemic Management of Type 2 Diabetes

The Diabetes Care Algorithms for Type 2 Diabetes included within this document are taken from the American Association of Clinical Endocrinologists (AACE) Road Maps which can be found in the May/June issue of Endocrine Practice, Vol. 13, Issue 3, 2007, pages 262–264 AND the American Diabetes Association's (ADA) Consensus Statement, Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy, 2006 (Diabetes Care, Volume 29, Number 8, August 2006, p. 1963—1972).

These algorithms serve as sample guides to assist diabetes practitioners in improving care associated with diabetes. The algorithms are not intended to replace or preclude clinical judgment or more intensive management. Use them as a quick reference to simplify diabetes treatments and as a way to improve care to patients with Type 2 diabetes.

An electronic version of this tool may be obtained from www.kentuckydiabetes.net.

Road Map to Achieve Glycemic Goals: Naïve to Therapy (Type 2)

Abbreviations in Road Maps:

AACE = American Association of Clinical Endocrinologists; A1C = hemoglobin A1c; ACE = American College of Endocrinology; AGI = α-glucosidase inhibitor; DPP-4 = dipeptidyl peptidase-4; FDA = US Food and Drug Administration; FPG = fasting plasma glucose; HDL = high-density lipoprotein; IFG = impaired fasting glucose; IGT = impaired glucose tolerance; MNT = medical nutrition therapy; OGTT = oral glucose tolerance test; PPG = postprandial glucose; Rx = treatment; SU = sulfonylurea; TZD = thiazolidinedione

Initial A1C%	Achieve ACE Glycemic Goals† (FPG, PPG, and A1C)	Intervention	Continuous Titration of Rx (2-3 months)	If ≤ 6.5% A1C Goal Not Achieved
6-7	Assess FPG and PPG	Initial therapy Preferred: • Metformin ⁴ • TZD ¹⁰ • AGI • DPP-4 Inhibitor • Alternatives • Glinides • SU (low dose) • Prandial Insulin ⁶	Monitor/adjust Rx to maximal effective dose to meet ACE Glycemic Goals	intensify Lifestyle Modification Intensify or combine Rx Including Incretin mimetic*1
7-8 Lifestyle	Target: PPG and FPG	Combine therapies ^{6,7} • Metformin • Gilnides • Alternatives • Prandial Insulin ⁶ • Premixed Insulin preparations ⁸ • Basal Insulin analog ⁹	Monitor/adjust Rx to maximal effective dose to meet ACE Glycemic Goals	Intensify Lifestyle Modification Intensify or combine Rx, Including incretin mimetic with SU, TZD, and/or metformin
yle Modification	Target: FPG and PPG	Combine therapies to address FPG and PPG ⁷ • Metformin	Monitor/adjust Rx to maximal effective dose to meet ACE Glycemic Goals	Intensify Lifestyle Modification Intensify or combine Rx, including prandial insulin ⁶ , incretin mimetic, ¹ or amylin analog [*] (with prandial insulin ⁶)
9-10 ation	Target: FPG and PPG	Combine therapies to address FPG and PPG7 • Metformin • TZD • SU • Basal Insulin analog [®] • NPH • Other approved combinations	Monitor/adjust Rx to maximal effective dose to meet ACE Glycemic Goals	intensify Lifestyle Modification Initiate or intensify Insulin therapy or add incretin mimetic ¹
>10	Insulin Therapy ^{2,3}	Basal insulin analog [®] or NPH + prandial insulin Premixed insulin preparations	Monitor/adjust Rx to maximal effective dose to meet ACE Glycemic Goals	Intensify Lifestyle Modification

therapy; incretin mimetic is not indicated for insulin-using patients

≤ 6.5% A1C

< 110 mg/dL FPG

< 110 mg/dL Preprandial

< 140 mg/dL 2-hr PPG





ACE/AACE Diabetes Road Map Task Force

Paul S. Jeilinger, MD, MACE, Co-Chair Jalme A. Davidson, MD, FACE, Co-Chair Lawrence Blonde, MD, FACP, FACE; Daniel Einhorn, MD, FACP, FACE; George Grunberger, MD, FACP, FACE; Yehuda Handelsman, MD, FACP, FACE; Richard Heilman, MD, FACP, FACE; Harold Lebovitz, MD, FACE; Philip Levy, MD, FACE; Victor L. Roberts, MD, MBA, FACP, FACE.

² For selected patients presenting with an A1C of >10%, certain oral agent combinations may be effective

³ Insulin sensitizer may be combined with initial insulin therapy

Preferred first agent in most patients

Rapid-acting insulin analog, inhaled insulin, or regular insulin
 Appropriate for most patients
 2 or more agents may be required

Analog preparations preferred

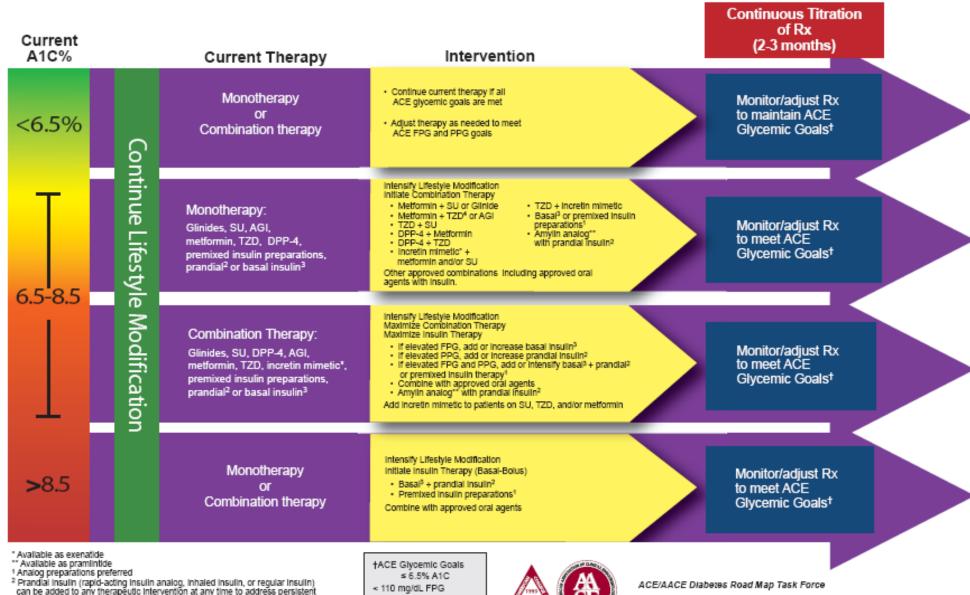
⁹ Available as glargine and detemir

¹⁰A recent report (NEJM: 6/14/07) suggests a possible link of rosiglitazone to cardiovascular events that requires further evaluation

Road Map to Achieve Glycemic Goals: Treated Patients (Type 2)

Abbreviations in Road Maps:

AACE = American Association of Clinical Endocrinologists; A1C = hemoglobin A1c; ACE = American College of Endocrinology; AGI = α-glucosidase inhibitor; DPP-4 = dipeptidyl peptidase-4; FDA = US Food and Drug Administration; FPG = fasting plasma glucose; HDL = high-density lipoprotein; IFG = impaired fasting glucose; IGT = impaired glucose tolerance; MNT = medical nutrition therapy; OGTT = oral glucose tolerance test; PPG = postprandial glucose; Rx = treatment; SU = sulfonylurea; TZD = thiazolidinedione



3 Avallable as glargine and detemir.

postprandial hyperglycemia

- < 110 mg/dL Preprandial
- < 140 mg/dL 2-hr PPG



Paul S. Jeilinger, MD, MACE, Co-Chair Jalme A. Davidson, MD, FACE, Co-Chair Lawrence Blonde, MD, FACP, FACE; Daniel Einhorn, MD, FACP, FACE; George Grunberger, MD, FACP, FACE; Yehuda Handelsman, MD, FACP, FACE; Richard Heliman, MD, FACP, FACE; Harold Lebovitz, MD, FACE; Philip Levy, MD, FACE: Victor L. Roberts, MD, MBA, FACP, FACE,

A recent report (NEJIM; 6/14/07) suggests a possible link of rosiglitazone to cardiovascular events that requires further evaluation



For full document information: American Diabetes Association http://care.diabetesjournals.org/cgi/reprint/30/suppl_1/S4 and http://care.diabetesjournals.org/cgi/reprint/29/8/1963

Management of Hyperglycemia in Type 2 Diabetes

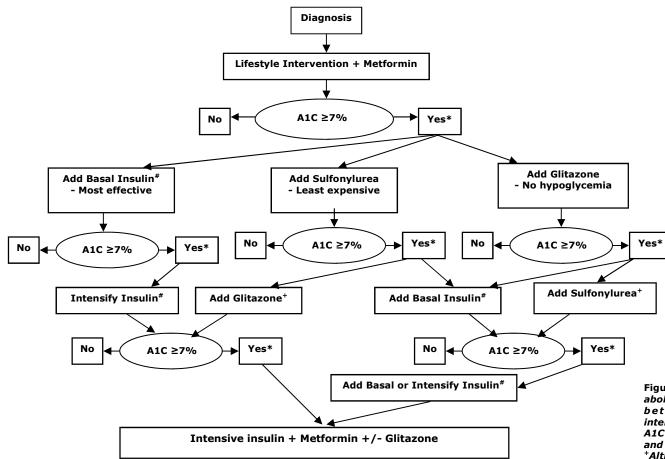


Figure 2—Algorithm for the metabolic management of type 2 diabetes. Reinforce lifestyle intervention at every visit. *Check A1C every 3 months until <7% and then at least every 6 months. *Although three oral agents can be used, initiation and intensification of insulin therapy is preferred based on effectiveness and expense. *See fig. 1 for initiation and adjustment of insulin.



For full document information: American Diabetes Association http://care.diabetesjournals.org/cgi/reprint/29/8/1963

Figure 1—Initiation and Adjustment of Insulin Regimens Nathan and Associates Start with bedtime intermediate-acting insulin or bedtime or morning long-acting insulin; can initiate with 10 units or 0.2 units per kg Check fasting glucose (fingerstick) usually daily and increase dose, typically by 2 units every 3 days until fasting levels are in target range (70-130 mg/dl or 3.89-7.22 mmol/l); can increase dose in larger increments, e.g. by 4 units every 3 days, if fasting glucose >180 mg/dl (>10mmol/l) If hypoglycemia A1C ≥7% after 2-3 months? occurs, or fasting If fasting bg in target range glucose level <70 mg/dl Yes No, (70-130 mg/dl or 3.89-7.22 (3.89 mmol/l), reduce mmol/l), check bg prebedtime dose by ≥4 units, or 10% if dose lunch, -dinner, and -bed; depending on bg results, >60 units. add second injection; can usually begin with ~4 units and adjust by 2 units every 3 days until bg in range Continue Pre-lunch ba regimen; out of range: Pre-bed bg Pre-dinner bg check A1C add rapidout of range: out of range: every 3 months acting insulin add rapidadd NPH insulin at at breakfast+ acting insulin breakfast+ or rapid acting at lunch at dinner No A1C ≥7% after 3 months Yes Recheck pre-meal bg levels and if out of range, may need to add another injection; if A1C continues to be out of range, check 2-h postprandial levels and adjust preprandial rapid-acting insulin

Figure 1—Initiation and adjustment of insulin regimens. Insulin regimens should be redesigned taking lifestyle and meal schedule into account. The algorithm can only provide basic guidelines for initiation and adjustment of insulin. See ref. 71 for more detailed instructions. †Premixed insulins are not recommended during adjustment of doses; however, they can be used conveniently, usually before breakfast and/or dinner if proportion of rapid—and intermediate-acting insulins is similar to the fixed proportions available. bg, blood glucose.